

8.11 CHARLES COUNTY

This chapter presents information about stream conditions of potential management interest in Charles County based on the 2000-2004 Maryland Biological Stream Survey (MBSS) results. Information from MBSS data collected between 1994 and 1997 can be found in MDNR 2001i.

8.11.1 Ecological Health

Based on the three ecological health indicators used by the MBSS, the overall condition of Charles County streams during 2000-2004 was Fair (Figure 8-78). The FIBI results indicate that 29% of the streams in the county were in Good condition, while 58% rated Good using the BIBI. In contrast, 29% of the streams in the county scored as Poor or Very Poor using the CBI, while 34% scored as Good and 38% scored as Fair.

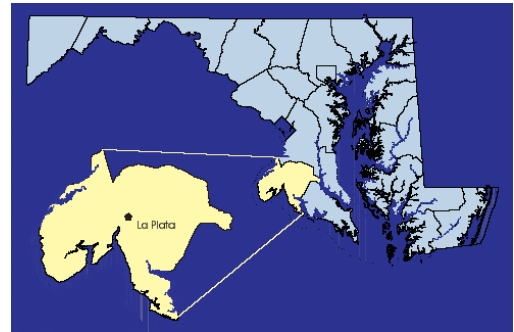
The highest concentration of sites with Good IBI scores occurred in Zekiah Swamp and Nanjemoy Creek. In contrast stream sites along the Route 301 corridor often rated as Very Poor. The highest rated stream in Charles County using the Combined Biotic Index (CBI) was an unnamed tributary to Zekiah Swamp, while the lowest rated streams included two unnamed tributaries to Nanjemoy Creek and Bowling Creek (Table 8-21). Based on Stream Waders volunteer data, the watershed in the county that had the largest number of sites rated as Poor or Very Poor for benthic macroinvertebrates was Port Tobacco, while Zekiah Swamp had the highest number of sites rated as Good (Table 8-22).

Five MBSS Sentinel sites were located in Charles County, an unnamed tributary to Zekiah Swamp Run, Mill Run, Swanson Creek, Hoghole Run and Mattawoman Creek. Sentinel sites were chosen to provide a representation of the best remaining streams around the state and track natural variations in stream health. Where possible, Sentinel sites are located in watersheds with as much protected land as possible, or in areas projected to become degraded from development at a slower pace. More information about the MBSS Sentinel stream network is found in: 2000-2004 Maryland Biological Stream Survey Volume 11: Sentinel Sites (http://www/dnr/Maryland.gov/streams/pubs/ea05-8_sentinel.pdf).

8.11.2 Physical Habitat

8.11.2.1 Overall Condition

Based on the Physical Habitat Index (PHI), 34% of the streams in Charles County had Minimally Degraded habitat, 54% had Partially Degraded habitat, and 12% had Degraded or Severely Degraded habitat (Figure 8-79). There was no strong geographic trend in habitat



condition, but most of the sites rated as Minimally Degraded occurred either in Zekiah Swamp or Nanjemoy Creek.

8.11.2.2 Trash

Over 69% of the stream miles in Charles County were rated Optimal for trash (Figure 8-80). In contrast, only 7% of streams were rated as being in Marginal or Poor condition. Sites with high levels of human refuse were scattered around the county, but were most frequent in the general vicinity of La Plata. In contrast, the highest concentration of sites with minimal or no trash was in Nanjemoy Creek.

8.11.2.3 Channelization

Nearly 11% of the stream miles in Charles County had some degree of channelization (Table 8-4). Earthen ditches and culvert pipes were the two types of documented channelization. There appeared to be more channelization in the eastern portion of the county than in the western part (Figure 8-81).

8.11.2.4 Inadequate Riparian Buffer

No stream miles in Charles County were devoid of riparian buffers during the 2000-2004 MBSS (Table 8-3). Only 1% of stream miles had severe breaks in existing riparian buffers (Figure 8-82). Additional information about buffer breaks, analyzed by county, is provided in: 2000-2004 Maryland Biological Stream Survey Volume 10: Riparian Zone Conditions (http://www/dnr/Maryland.gov/streams/pubs/ea05-7_riparian.pdf).

8.11.2.5 Eroded Banks/Bedload Movement

Nearly 57% of the stream miles in Charles County were rated as having minimal (Optimal) bank erosion (Figure 8-83). In contrast, 21% of streams had erosion rated as Poor or Marginal. Sites with a high degree of bank erosion were located primarily in the southeastern portion

of the county and in the area south of La Plata. Bank erosion was generally minimal in Zekiah Swamp.

Nearly 24% of the stream miles in Charles County were rated as having extensive bar formation (Figure 8-83). An additional 40% had moderate bar formation, and no streams were devoid of bars. There was no clear geographic pattern in the degree of bar formation in Charles County.

8.11.3 Key Nutrients

8.11.3.1 Nitrate-Nitrogen

About 86% of the stream miles in Charles County had nitrate-nitrogen levels similar to streams with mostly forested (> 90%) watersheds (Figure 8-84). The remaining 14% of stream miles had elevated levels, but no streams sampled had levels about the 5 mg/l threshold beyond which biological effects are evident in MBSS data. All sites with elevated levels of nitrate-nitrogen were located in the eastern portion of the county.

8.11.3.2 Total Phosphorus

Similar to the pattern observed for nitrate-nitrogen, 60% of all stream miles in Charles County had total phosphorus levels within the range found in mostly forested (> 90%) streams in Maryland (Figure 8-85). Of the remaining streams, 15% had levels above the threshold for potential biological effects. Sites with high levels of total phosphorus were all located in the eastern portion of the county, but moderately elevated levels of total phosphorus were found in the western portion of the county as well.

8.11.4 Stream and River Biodiversity

To provide a means to prioritize stream systems for biodiversity protection and restoration within each county and on a statewide basis, a tiered watershed and stream reach prioritization method was developed. Special emphasis was placed on state-listed species, stronghold watersheds for state-listed species, and stream reaches with one or more state-listed aquatic fauna. Fauna considered included stream salamanders, freshwater fishes, and freshwater mussels. Rare, pollution-sensitive benthic macroinvertebrates collected during the 1994-2004 MBSS were also used to identify the suite of watersheds necessary to conserve the full array of known stream and river biota in Maryland. A complete description of the biodiversity ranking process is found in: 2000-2004 Maryland Biological Stream Survey Volume

9: Stream and Riverine Biodiversity (http://www/dnr/Maryland.gov/streams/pubs/ea05-6_biodiv.pdf).

Of the nine watersheds found in Charles County, four were classified as Tier 1 (Figure 8-86). These watersheds serve as strongholds for one or more state listed species. Within Tier 1 watersheds, the highest rated was Zekiah Swamp. It is of note that Zekiah Swamp was ranked first overall in the state for freshwater biodiversity. Other Tier 1 watersheds included Nanjemoy Creek, Wicomico River, and Potomac Upper Tidal/Oxon Creek. In contrast, the Patuxent River Lower watershed was the lowest ranking for stream and river biodiversity in the county, and ranked 78th of 84 in Maryland. Any reaches that had either state-listed species or high intactness values were highlighted to facilitate additional emphasis in planning restoration and protection activities. This additional information is especially helpful in watersheds that have extreme ranges of quality and level of disturbance within them, such as Potomac Upper Tidal/Oxon Creek.

8.11.5 Stressors

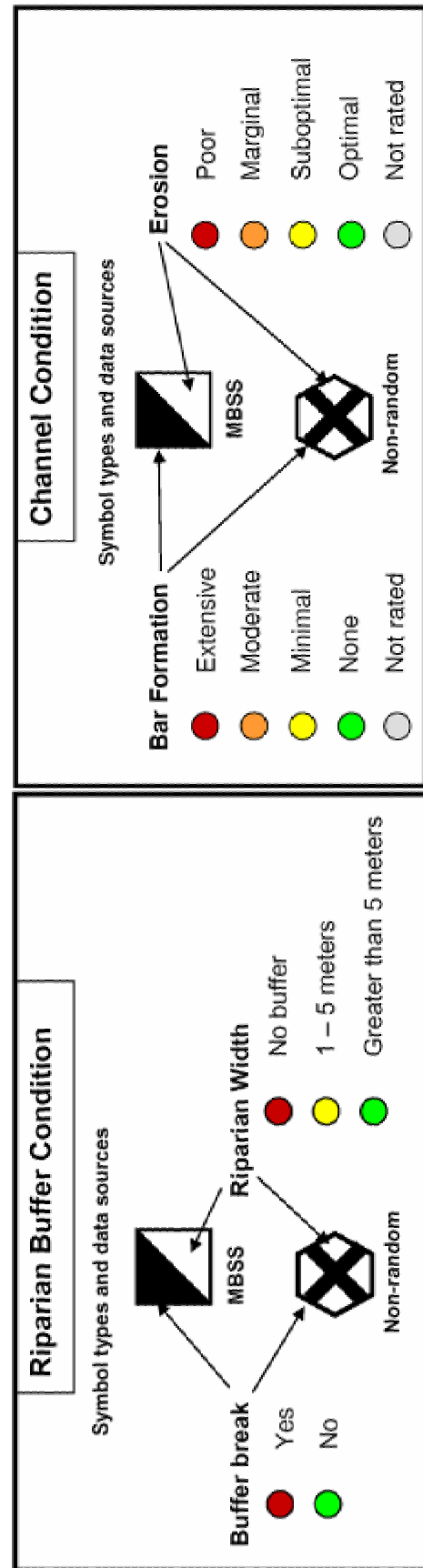
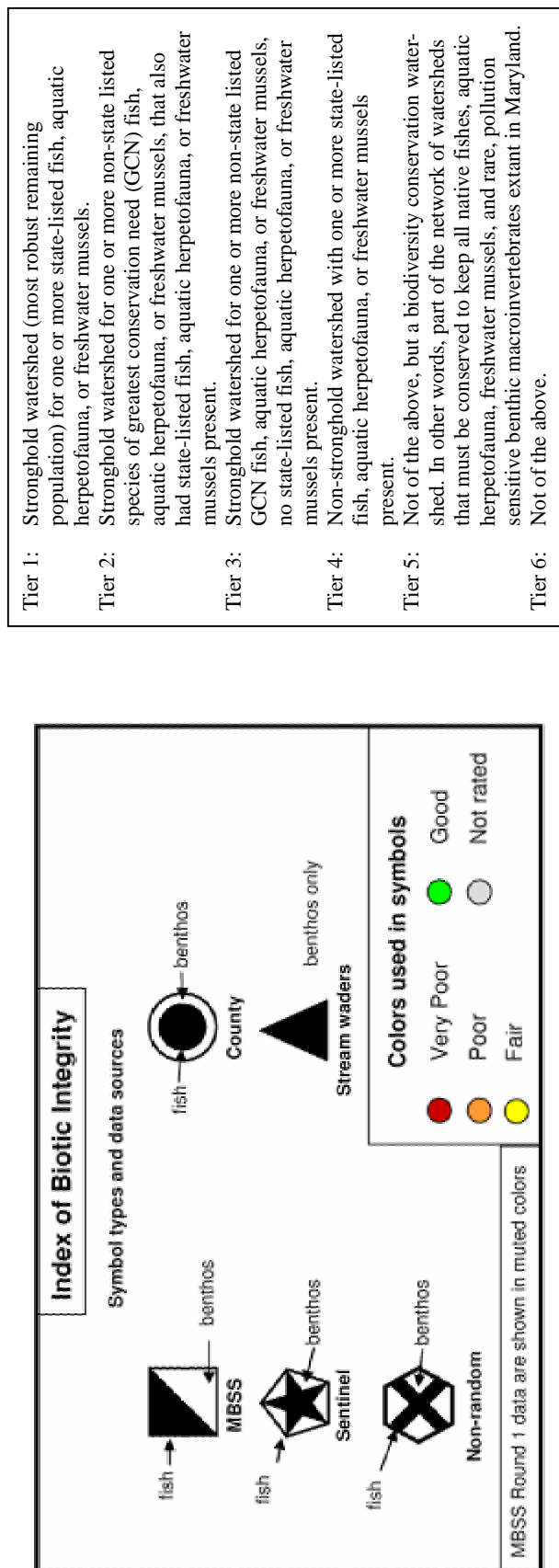
At 78% of stream miles, the most extensive stressor characterized by the MBSS in Charles County during the 2000-2004 MBSS was non-native terrestrial plants in the riparian (Figure 8-5). Other stressors found extensively were: streams with acid deposition (74% of stream miles); non-native aquatic fauna (present in 47% of stream miles); streams with >5% urban land use upstream (45% of stream miles); eroded banks (22% of stream miles); low dissolved oxygen (observed in 7% of stream miles); and channelized streams (5% of stream miles).

AN IMPORTANT NOTE ON BIODIVERSITY MANAGEMENT

Perhaps the largest ongoing natural resources restoration and protection effort in Maryland is associated with the Chesapeake Bay. In most cases, freshwater biodiversity is not specifically considered during placement and prioritization of Bay restoration and protection projects. In this report and in the more detailed volume in the series on aquatic biodiversity, a system of biodiversity ranking is presented to provide counties and other stewards with a means to plan appropriate protection and restoration activities in locations where they would most benefit stream and river species. Given the historically low level of funding for biodiversity protection and restoration in Maryland and elsewhere, the potential benefit of incorporating freshwater biodiversity needs into other efforts is quite large.

However, it is important to note that although freshwater taxa are the most imperiled group of organisms in Maryland, other groups and individual species not typically found in freshwater habitats are also at high risk and constitute high priority targets for conservation. In addition, freshwater taxa that prefer habitats such as small wetlands may not be well-characterized by the ranking system employed here. To conserve the full array of Maryland's flora and fauna, it is clearly necessary to use other, landscape-based tools and consider factors such as maintaining or reconnecting terrestrial travel corridors.

Key to MBSS 2000-2004 County Maps



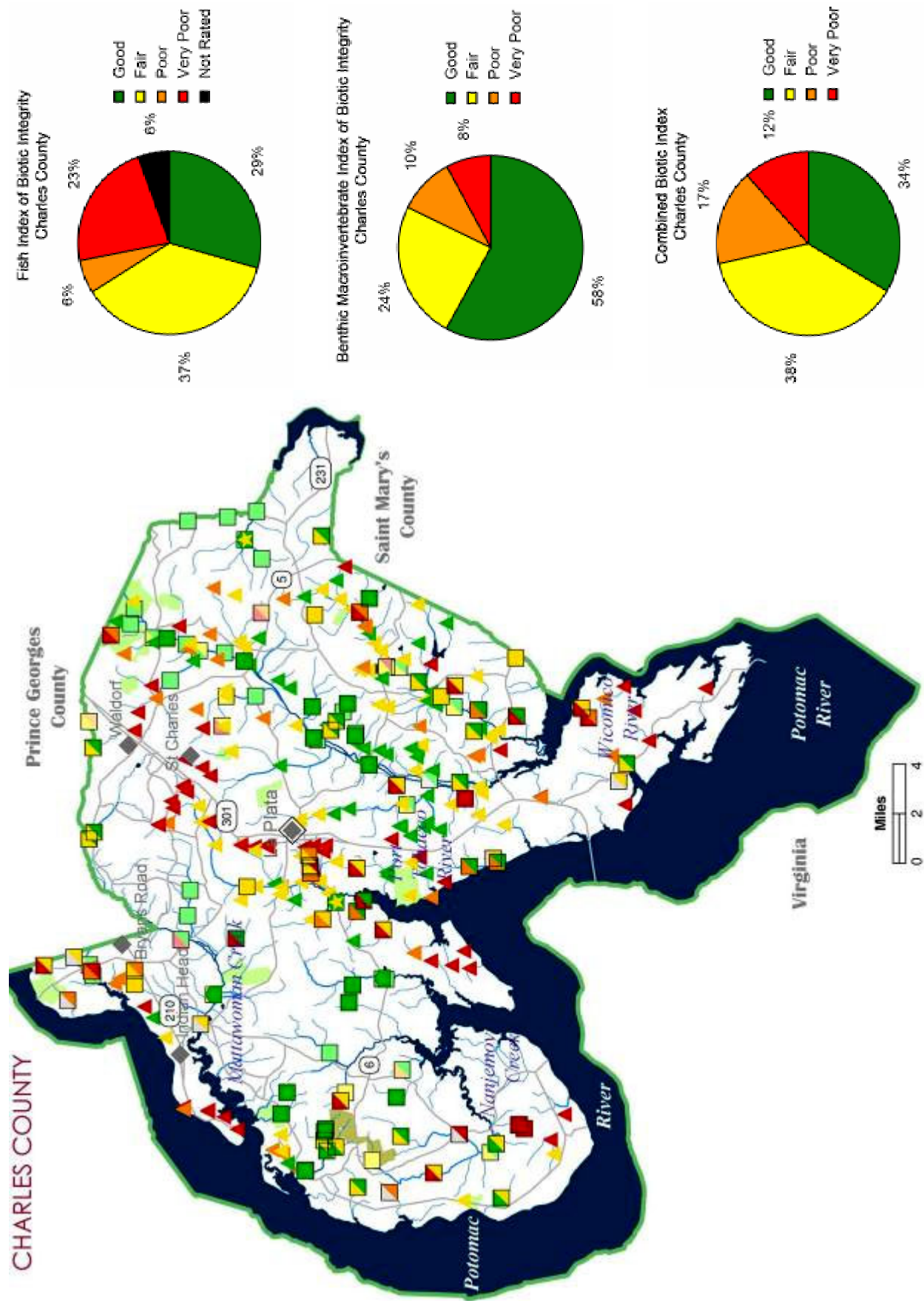


Figure 8-78. Benthic Index of Biotic Integrity (BIBI) and Fish Index of Biotic Integrity (FIBI) pie charts and map of stream health for Charles County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie charts represent 2000-2004 data only, Combined Biotic Index pie chart represents mean of FIBI and BIBI)

Table 8-21. MBSS sites sampled in Charles County during 1994- 2004, ranked by Combined Biotic Index Score (CBI)

Charles County - MBSS Sites			
SITE NUMBER	STREAM NAME	WATERSHED	CBI
<i>Best (in order of CBI score)</i>			
CH-S-288-101-95	Zekiah Swamp Run UT	Zekiah Swamp	5.00
ZEKI-305-R-2001	Zekiah Swamp Run	Zekiah Swamp	4.83
GILB-115-R-2001	Smoots Pond Run	Gilbert Swamp	4.71
CH-S-036-213-95	Zekiah Swamp Run	Zekiah Swamp	4.71
CH-S-062-313-95	Zekiah Swamp Run	Zekiah Swamp	4.71
ZEKI-215-R-2001	Zekiah Swamp Run UT1	Zekiah Swamp	4.71
CH-S-089-205-95	Wards Run	Nanjemoy Creek	4.69
CH-S-002-207-95	Hoghole Run	Port Tobacco River	4.69
CH-S-039-203-95	Pomonkey Creek UT	Potomac River Middle (Tidal)	4.69
CH-S-225-324-95	Zekiah Swamp Run	Zekiah Swamp	4.69
PRMT-118-R-2002	Reeder Run UT	Potomac River Middle (Tidal)	4.57
MATT-033-S-2004	Mattawoman Creek	Mattawoman Creek	4.55
CH-S-327-221-95	Old Womans Run	Mattawoman Creek	4.55
CH-S-331-301-95	Mill Run	Nanjemoy Creek	4.55
CH-S-331-304-95	Mill Run	Nanjemoy Creek	4.55
NANJ-111-R-2000	Mill Run UT1	Nanjemoy Creek	4.55
CH-S-231-202-97	Swanson Creek	Patuxent River Lower	4.55
CH-S-091-131-97	Swanson Creek UT	Patuxent River Lower	4.55
PRMT-105-R-2004	Reeder Run UT	Potomac River Middle (Tidal)	4.55
MATT-212-R-2000	Mattawoman Creek UT3	Mattawoman Creek	4.52
CH-S-292-211-95	Old Womans Run	Mattawoman Creek	4.52
PTOB-002-S-2000	Hoghole Run	Port Tobacco River	4.52
PRMT-315-R-2002	Reeder Run UT	Potomac River Middle (Tidal)	4.52
CH-S-257-306-95	Wolf Den Branch	Zekiah Swamp	4.52
ZEKI-012-S-2001	Zekiah Swamp Run	Zekiah Swamp	4.52
<i>Worst (most degraded sites first)</i>			
NANI-109-R-2000	Nanjemoy Creek UT1	Nanjemoy Creek	1.29
NANI-117-R-2000	Nanjemoy Creek UT1	Nanjemoy Creek	1.43
ZEKI-118-R-2001	Bowling Creek	Zekiah Swamp	1.43
GILB-213-R-2001	Gilbert Creek	Gilbert Swamp	1.57
NANI-205-R-2000	Hancock Run	Nanjemoy Creek	1.57
CH-S-213-120-95	Nanjemoy Creek UT	Nanjemoy Creek	1.76
WICO-118-R-2004	Wicomico River UT1	Wicomico River	1.86
CH-S-188-134-95	Mill Dam Run	Zekiah Swamp	1.90
ZEKI-116-R-2001	Wolf Den Branch UT1	Zekiah Swamp	1.90
PRMT-201-R-2002	Mill Swamp Run UT1	Potomac River Middle (Tidal)	1.95
CH-S-293-136-95	Piney Branch UT	Zekiah Swamp	2.00
PRMT-118-R-2004	Potomac River UT26	Potomac River Middle (Tidal)	2.14
PRUT-117-R-2001	Potomac River UT12	Potomac River Upper (Tidal)	2.14
PTOB-002-S-2003	Hoghole Run	Port Tobacco River	2.14
GILB-112-R-2001	Ford Run	Gilbert Swamp	2.29
PTOB-118-R-2003	Wills Branch	Port Tobacco River	2.29
PTOB-119-R-2003	Port Tobacco Creek UT1	Port Tobacco River	2.29
WICO-101-R-2004	Wicomico River UT1	Wicomico River	2.29
NANI-119-R-2000	Jane Berrys Run UT1	Nanjemoy Creek	2.43
PRUT-116-R-2001	Potomac River UT13	Potomac River Upper (Tidal)	2.43
PTOB-106-R-2003	Port Tobacco Creek UT3	Port Tobacco River	2.43
ZEKI-103-R-2001	Zekiah Swamp Run UT4	Zekiah Swamp	2.48
PTOB-109-R-2003	Hoghole Run UT1	Port Tobacco River	2.50
PTOB-104-R-2003	Port Tobacco Creek UT2	Port Tobacco River	2.55
WICO-105-R-2004	Newport Run UT	Wicomico River	2.57

Table 8-22. Stream Waders sites sampled in Charles County during 2000-2004, ranked by Family-level Benthic Index of Biotic Integrity

Charles County - Stream Wader Sites				
WATERSHED	# GOOD	# FAIR	# POOR	# VERY POOR
Gilbert Swamp	11	17	7	3
Mattawoman Creek	14	10	4	12
Nanjenoy Creek	4	7	0	0
Port Tobacco River	8	18	7	26
Potomac River Lower (Tidal)	0	2	3	6
Potomac River Middle (Tidal)	2	4	7	3
Wicomico River	0	0	2	5
Zekiah Swamp	28	19	8	10

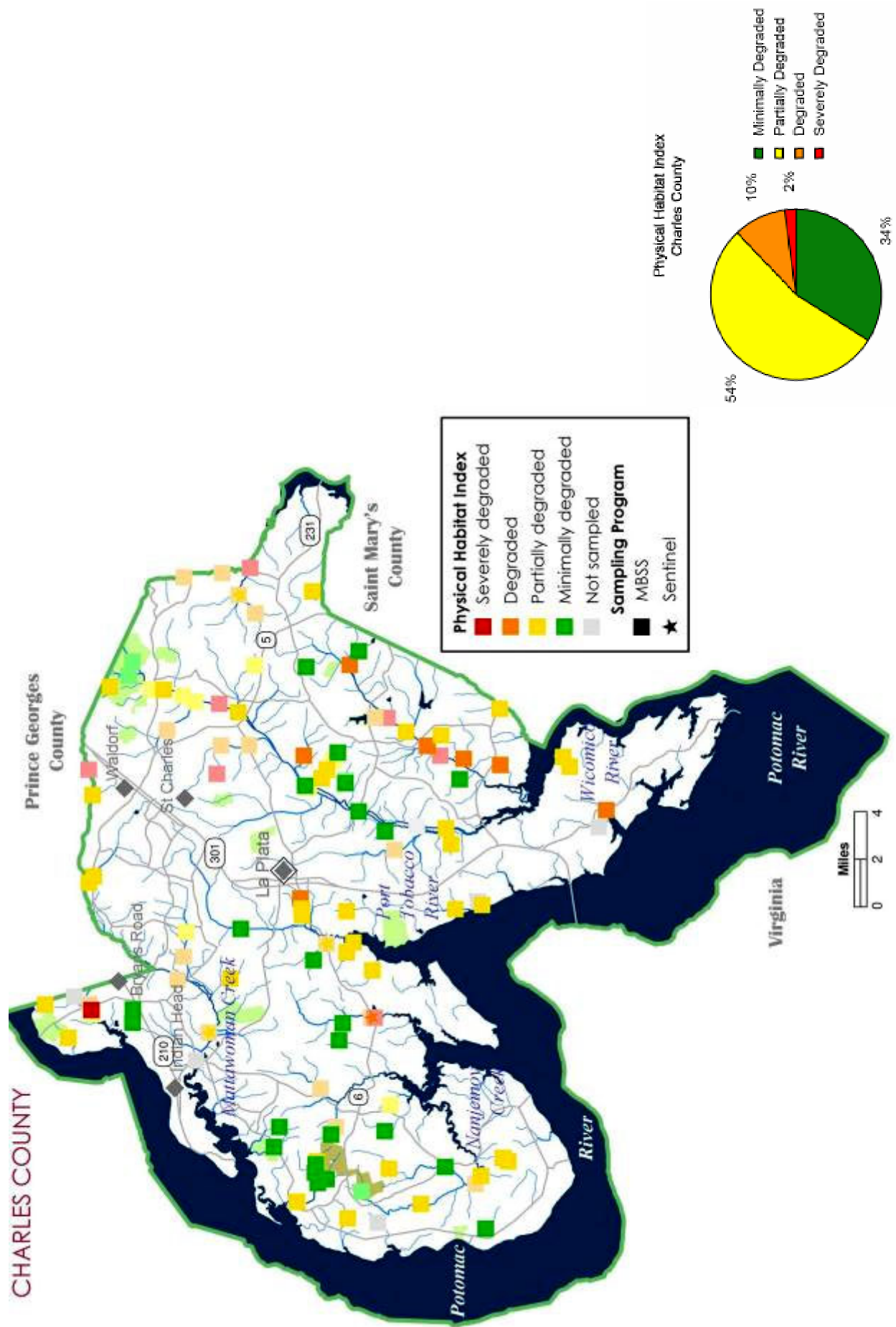


Figure 8-79. Physical Habitat Index (PHI) pie chart and map of stream habitat quality for Charles County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie chart represents 2000-2004 data only)

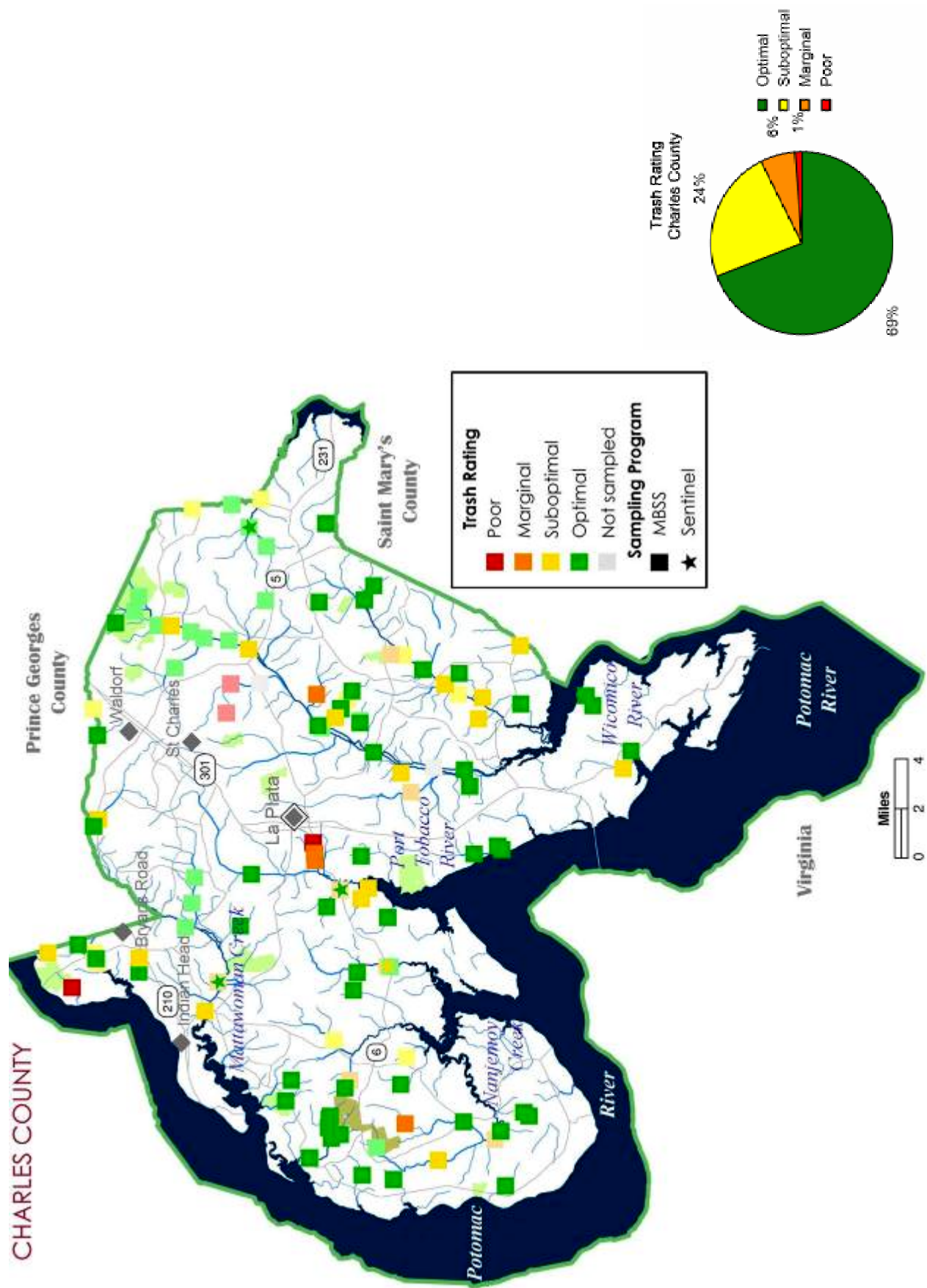


Figure 8-80. Pie chart and map of trash rating (0-20 scale) for Charles County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie chart represents 2000-2004 data only)

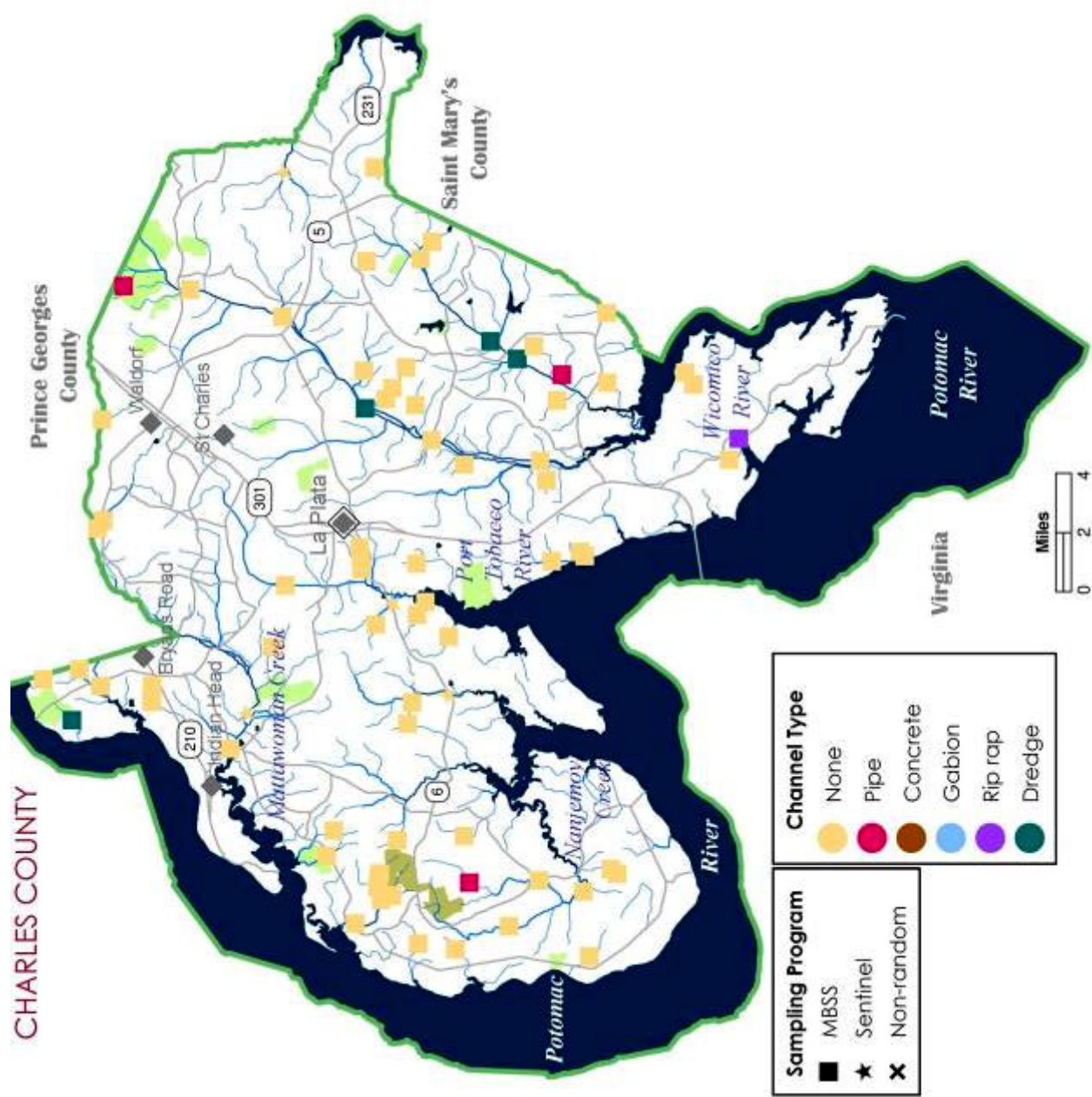


Figure 8-81. Map of channelized sites, by type, for Charles County streams sampled by the MBSS during 2000-2004. *NOTE: When channelization is indicated, it does not necessarily mean that the entire 75m segment was affected.*

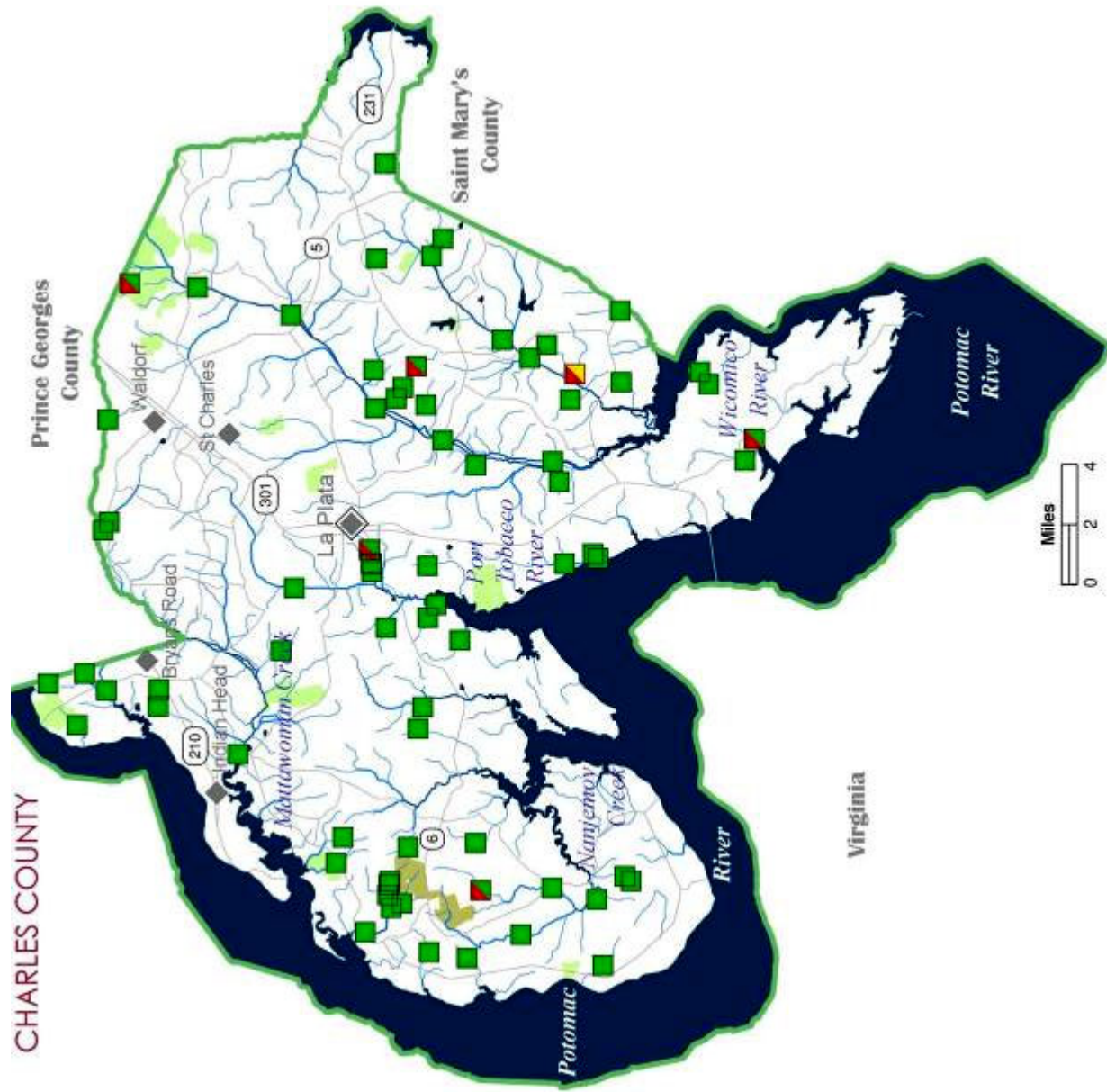


Figure 8-82. Map of sites with inadequate riparian buffers and buffer breaks for Charles County streams sampled by the MBSS during 2000-2004. *NOTE: Multiple riparian buffer breaks sometimes occurred at a site; only the most severe was depicted.*

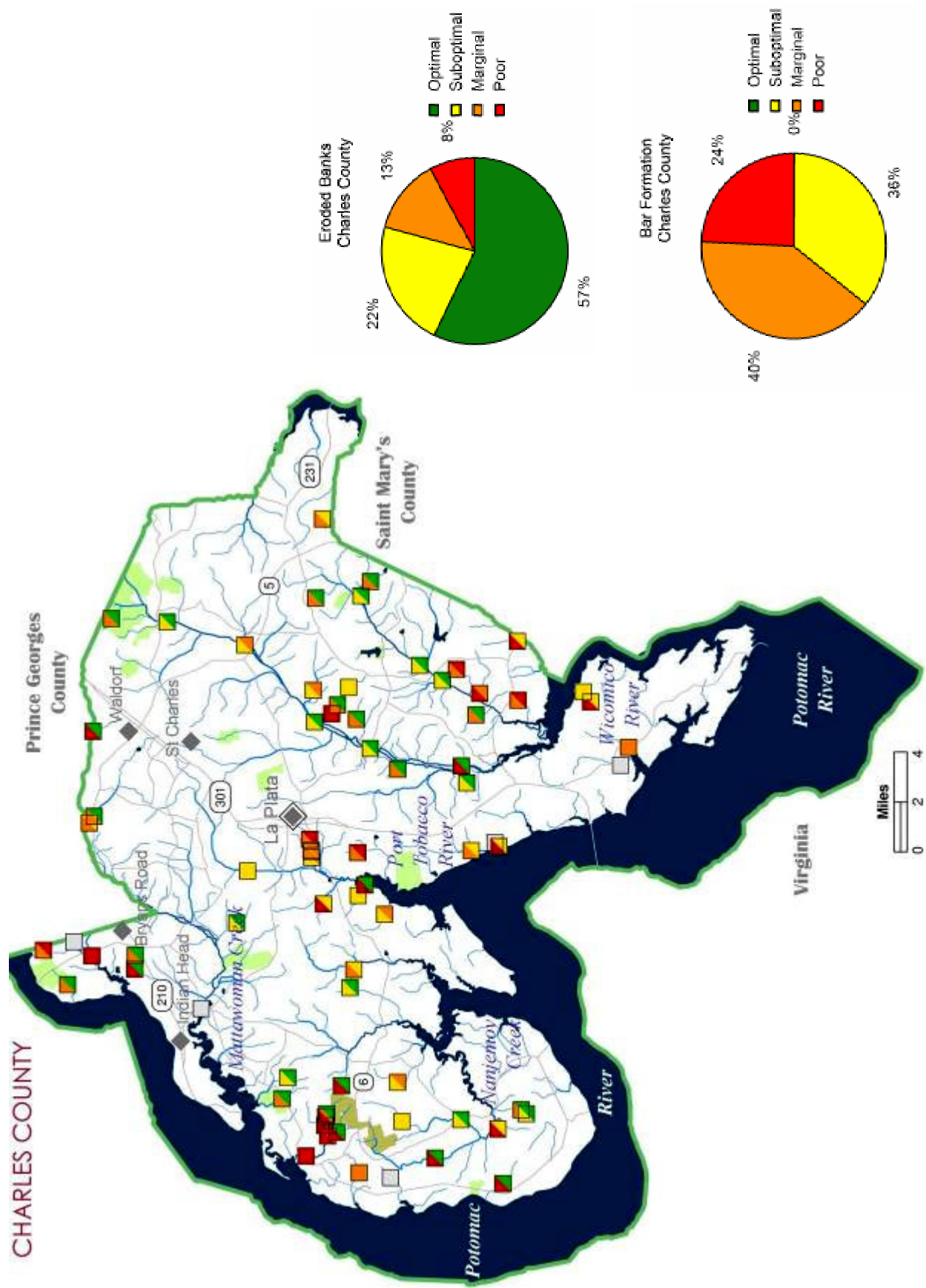


Figure 8-83. Pie charts and map of sites with eroded banks and instream bar formation for Charles County streams sampled by the MBSS during 2000-2004

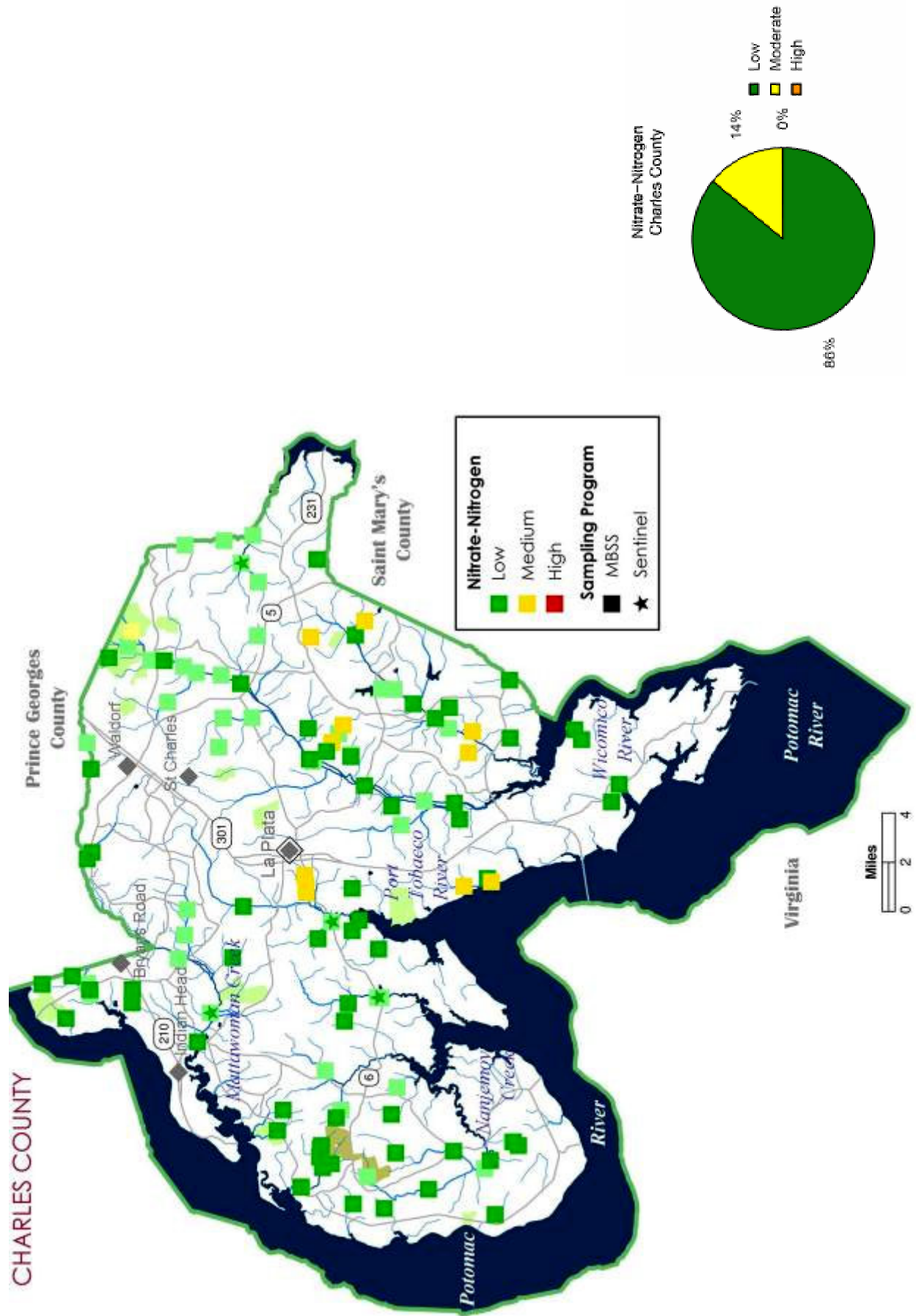


Figure 8-84. Pie chart and map of nitrate-nitrogen values (mg/l) for Charles County streams sampled by the MBSS during 1995-97 and 2000-2004 (pie chart represents 2000-2004 data only) (Low = 1.0, Medium = 1.0 – 5.0, High = > 5.0)

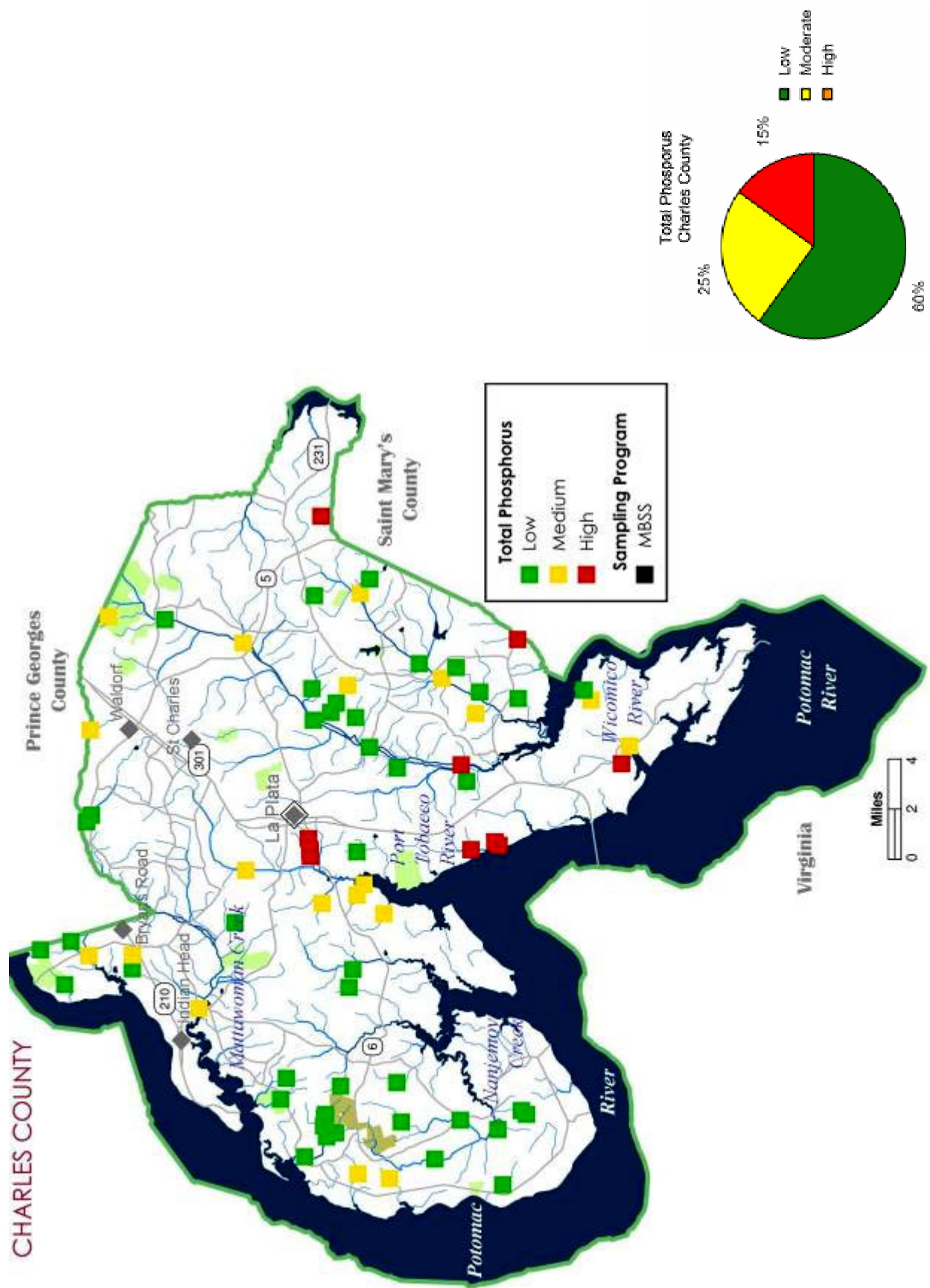


Figure 8-85. Pie chart and map of total phosphorus values (mg/l) for Charles County streams sampled by the MBSS during 2000-2004 (Low = < 0.025 , Medium = $0.025 - 0.07$, High = > 0.07)

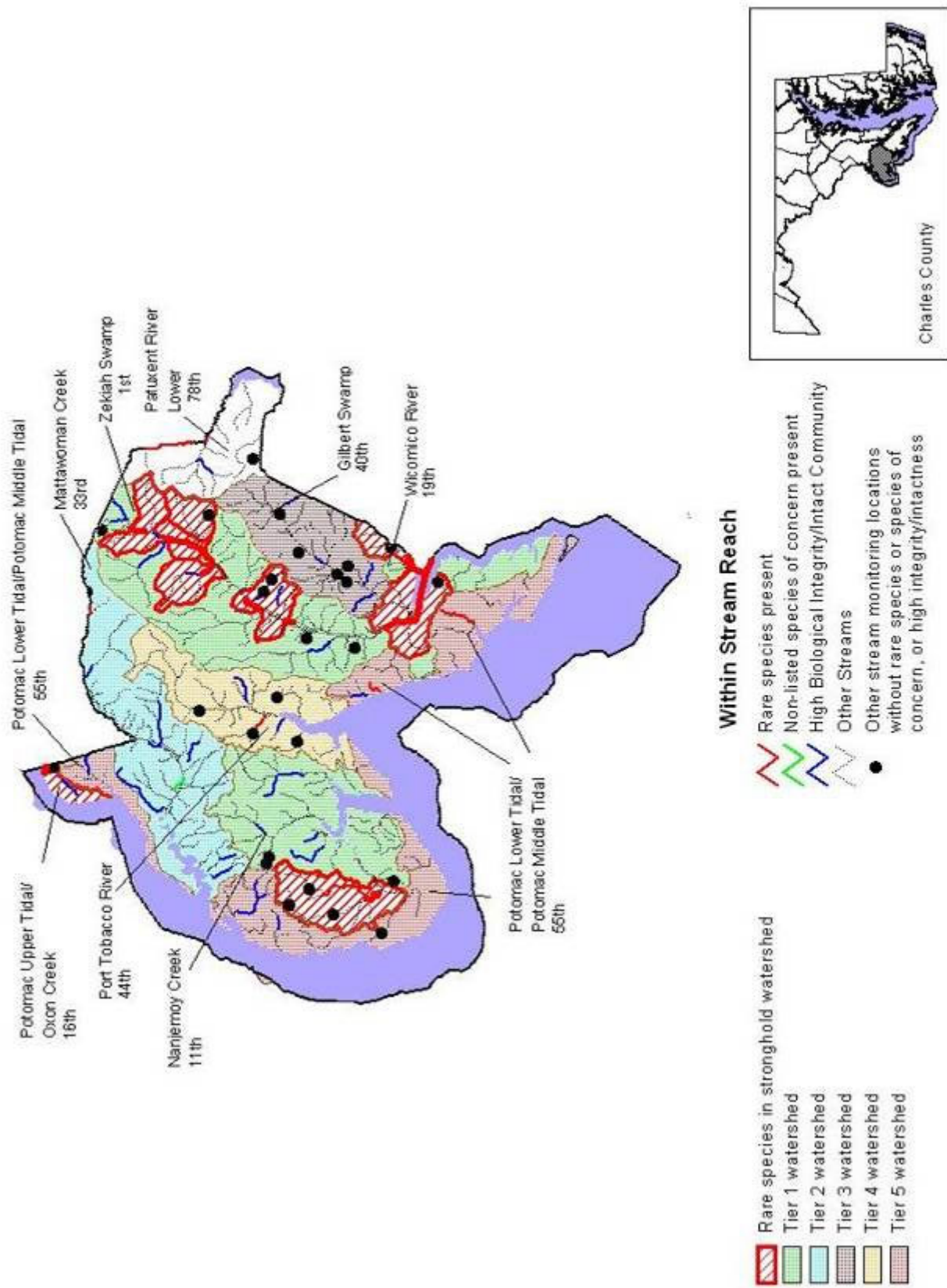


Figure 8-86. Aquatic Heritage Biodiversity Ranking map for Charles County, by watershed. Data from MBSS 1994-2004, MBSS qualitative data, Raesly, unpub. data, Harris 1975, Thompson 1984, and DNR Natural Heritage Program database.